

Special Topics on Applied Mathematical Logic
Spring 2012
National Taiwan University

Problem Set 5

Due on 2012/05/08

Drop your solution in the instructor's mail box at EE2 building by 18:00

1 [Models of Theories]

Exercises 1, 2, and 3 of Section 2.6.

2 [Natural Deduction]

- (a) Find a deduction for the statement $((\forall x.Px) \wedge (\forall y.Py \Rightarrow Qy)) \Rightarrow \forall y.Qy$.
- (b) Find a deduction for $((A \Rightarrow B) \wedge (A \Rightarrow C)) \Rightarrow (A \Rightarrow (B \wedge C))$ and its representation in λ -terms.
- (c) Define $\lceil T \rceil = \lambda x.\lambda y.x$ and $\lceil F \rceil = \lambda x.\lambda y.y$. Furthermore, let $\lceil \text{if } t \text{ then } u \text{ else } v \rceil = tuv$. Show $\lceil \text{if } T \text{ then } u \text{ else } v \rceil = u$ and $\lceil \text{if } F \text{ then } u \text{ else } v \rceil = v$.